Indiana Department of Environmental Management
Exceptional Events Request
for
May 23 – June 2, 2007

Event

During the period of May 23 – June 2, 2007, smoke from wildfires in northern Florida and southern Georgia impacted the State of Indiana by causing several exceedances of the 24-hour $PM_{2.5}$ NAAQS and significantly elevating $PM_{2.5}$ levels as a whole for the majority of the State. IDEM has compiled this comprehensive report to demonstrate that these elevated concentrations were due to an "exceptional event" and are requesting that the EPA concur with our decision to flag these values with an 'E' in AQS. Although the majority of the values to be flagged are not exceedances of the 24-hour $PM_{2.5}$ NAAQS, IDEM still requests for these values to be flagged as they will be used in design value calculations for the current 2005-2007 period as well as the next two periods; 2006-2008 and 2007-2009.

Exceptional Events Criteria

EPA defines an "exceptional event" as an unusual or naturally occurring event that can affect air quality but is not reasonably controllable by state and local agencies. Exceptional events are events for which the normal planning and regulatory process established by the clean air act are not appropriate. IDEM will illustrate through the use of maps, meteorological data, speciation data, trajectory models and historical data that the smoke from wildfires in Florida and Georgia were the cause of the statewide elevated $PM_{2.5}$ values and should therefore be flagged as Indiana had no control over this event.

Particulate Source

The high $PM_{2.5}$ values originated from wildfires in northern Florida and southern Georgia. One of the largest fires was located in the Okefenokee National Wildlife Refuge and was known as the Bugaboo Scrub Fire. This fire started on May 5 and continued through June. During the period of the elevated $PM_{2.5}$ values in Indiana, the combined fires had burned over 500,000 acres making it one of the largest in modern history in the lower 48 states (www.inciweb.org). Appendix 1 lists several news publications about the fire along with a map of the local area to illustrate the amount of acreage burned.

Overall Impact

The smoke from the fires began to influence $PM_{2.5}$ values in Indiana beginning May 22 as levels began to rise in southern and central Indiana. The impact becomes a statewide event on the May 23 and May 24. As weather conditions changed on the 25th, the northern part of the state is not affected by the fire again until May 29, but areas from Indianapolis to southern Indiana continue to be impacted. From May 29 through May 31, the entire state is again impacted by the smoke from the fires. The event ends for all of the state on the 31st, with the exception of southeast Indiana, which continues to be impacted on June 1 and June 2. The event is over on June 3.

Data

Table 1 lists the data for the time period from May 21 through June 5. The values which Indiana has determined as being impacted by the wildfires in Florida and Georgia are highlighted in yellow.

Table 1 – $PM_{2.5}$ Data

REGION	COUNTY NAME	NAME OF SITE	5/21	5/22	5/23	5/24	5/25	5/26	5/27	5/28	5/29	5/30	5/31	6/1	6/2	6/3	6/4	6/5
Northwest Indiana	Lake	E. Chicago - Franklin Sch.	14.3			29.5			8.0			32.5			11.0			5.2
	Lake	Gary - IITRI	12.7			28.4			8.8			31.9			11.1			3.9
	Lake	Gary - Burr St.	19.0			31.2			9.4			36.8			12.0			4.7
	Lake	Griffith	13.6			27.6			IN			IN			10.2			5.0
	Lake	Gary - Madison St	14.2			27.6			IN			IN			10.7			5.4
	Lake	Gary - Ivanhoe Sch.	16.0			30.4			9.4			33.1			11.1			4.2
	Lake	Hammond - Purdue	14.2			30.1			IN			32.4			10.5			5.5
	Lake	Hammond - Clark HS	14.1			39.3			8.3			32.2			11.9			3.6
	LaPorte	Michigan City - Marsh Sch	11.3	16.6	31.7	27.9	9.1	12.5	10.1	12.6	36.7	31.5	30.2	18.4	10.7	9.2	6.9	3.0
	LaPorte	LaPorte - Lake St	11.8			27.0			8.8			31.0			11.6			2.9
	Porter	Dunes Nat'l Lakeshore	10.8			25.8			8.9			30.1			10.4			2.9
	Porter	Ogden Dunes	IN			27.9			9.3			31.5			11.4			3.5
North Central Indiana	Elkhart	Elkhart - Pierre Moran Sch.	11.4	16.6	32.8	30.9	11.0	17.0	15.5	16.0	34.7	32.8	31.3	22.0	IN	IN	IN	4.0
	St. Joseph	S. Bend - Nuner Sch.	11.8	18.8	33.9	31.7	10.6	18.3	13.7	15.3	37.1	34.0	32.0	IN	IN	IN	IN	4.3
	St. Joseph	S. Bend - Shields Dr.	IN			28.6			11.7			30.8			IN			3.8
	St. Joseph	S. Bend - LaSalle HS	11.1			28.7			10.2			31.3			IN			3.5
Northeast Indiana	Allen	Fort Wayne - Beacon St.	9.4	26.0	43.4	34.9	21.1	19.7	17.8	15.0	33.8	33.7	33.0	IN	IN	IN	IN	IN
	Allen	Fort Wayne - Taylor Univ.	8.8			31.0			16.9			33.1			IN			IN
Central Indiana	Delaware	Muncie - Central HS	IN	IN	36.0	31.4	30.7	24.7	22.4	21.3	35.1	33.4	30.2	24.6	19.4	23.5	7.2	5.2
	Henry	Mechanicsburg	14.6			30.7			21.5			32.4			IN			IN
	Howard	Kokomo	14.0			30.6			20.5			33.5			15.1			5.7
	Madison	Anderson - W. 5th St	16.2	19.5	36.4	29.4	30.2	27.8	24.5	22.8	38.0	32.9	32.6	28.5	19.1	19.7	6.8	4.6
	Marion	Indpls - Mann Rd.	16.3			30.7			23.0			31.0			18.7			7.4
	Marion	Indpls -West St.	24.4			31.6			25.1			33.2			21.1			7.7
	Marion	Indpls - English Ave.	19.4	23.1	37.9	33.1	35.8	31.3	26.6	28.7	37.9	34.1	34.6	29.4	23.0	19.4	7.0	7.5
	Marion	Indpls - Washington Park	19.1	22.5	38.5	31.9	34.9	29.3	24.5	26.3	37.6	34.1	32.0	26.5	20.2	19.2	7.7	6.3
	Marion	Indpls - E. 75th St.	16.3			30.5			25.2			32.4			18.9			5.8
	Marion	Indpls - W. 18th St.	17.7			IN			25.4			31.4			19.3			6.2
	Marion	Indpls - E. Michigan St.	18.4			30.2			25.3			32.9			21.6			6.3
West Central Indiana	Tippecanoe	Lafayette - Greenbush St.	15.6	18.3	34.7	27.8	21.9	24.6	19.8	19.4	36.8	32.7	30.0	23.2	15.7	13.3	5.9	6.6
	Vigo	Terre Haute - Lafayette Ave	16.0			28.8			21.5			29.2			18.0			6.9
	Vigo	Terre Haute - Devaney Sch.	14.9	20.1	32.6	27.7	30.4	25.4	21.2	23.2	39.6	29.6	30.5	20.3	16.8	13.6	5.5	6.6
Southwest Indiana	Dubois	Jasper - Sport	15.4			25.7			30.0			IN			22.8			11.2
	Dubois	Jasper - Golf	16.5			26.5			30.0			33.1			20.2			10.3
	Dubois	Jasper - Post Office	IN	21.9	28.4	25.0	25.9	41.5	30.5	34.2	39.5	31.8	IN	21.5	IN	IN	IN	IN
	Knox	Southwest Ag Center	18.2			28.4			29.5			29.1			20.3			7.8
	Spencer	Dale	17.0			25.5			30.5			31.2			23.8			10.6
	Vanderburgh	Evansville - Civic Center	15.0			IN			IN			26.5			IN			IN
	Vanderburgh	Evansville - Mill Rd.	IN			23.9			29.9			28.0			19.8			7.7
	Vanderburgh	Evansville - U of E	14.9			25.8			27.7			27.6			22.3			8.0
Southeast Indiana	Clark	Jeffersonville - Walnut St	24.3	25.5	IN	32.0	32.8	32.6	28.9	33.8	38.2	29.2	33.4	32.3	40.2	23.3	11.0	15.2
	Floyd	New Albany	18.0			29.7			25.4			28.4			35.1			9.7

Exceptional Events Data

Investigation of High PM2.5 Values

To determine the cause of the high $PM_{2.5}$ values during the period from May 23 through June 2, several analyses were performed. Knowing where the air mass with the high $PM_{2.5}$ concentrations had been prior to moving across Indiana and what influenced it along the way are key to determining if the values were locally produced or transported into Indiana. When all the individual analyses are put together and compared, the source of the high values reported in Indiana is from the wildfires in southern Georgia and northern Florida.

Trajectory Modeling

Back trajectory modeling provides an indication of where a parcel of air had been at a given point in time. If the forward trajectory from a suspected source matches up with the back trajectory from that time period, there is a strong probability that the air mass from the suspected source did impact a site or area a day or several days after the fact. Back trajectories for the individual areas are included in the individual report. As forward trajectory models are the same for each report, they are listed in Appendix 2.

Weather Maps

Individual weather maps for a given day provide a good indication of atmospheric conditions and the general air flow. The daily weather maps are included with each area report.

Smoke Maps

Daily smoke maps from NOAA Satellite and Information Service show the spatial impact of smoke from major fires along with its intensity. The smoke maps are included in each report.

Wind Roses

Daily wind roses provide the localized wind speed and wind directions for a particular area on a given day. The daily wind roses are included in each area report.

Using the wind roses with the trajectory models and the weather maps provide a picture of the meteorological conditions on that day.

Carbon Data

Speciated data is available from seven (7) sites in Indiana. Six (6) of the sites operate on a 1/6 day sampling schedule, while the Indianapolis site collects data every third day. During this period, very high organic carbon values were recorded. The elemental carbon values did not increase and remained at average or below average concentrations. High organic carbon values, without an increase in elemental carbon, are a very good indicator of biomass combustion. The high organic carbon values were not only seen in Indiana, but followed a general pattern from southern Georgia, through the eastern Mississippi River Valley and across the Midwest and Ohio River Valley. Maps with the plotted organic carbon values during the May 18 through June 5 are in Appendix 3. The time progression of the maps shows the rise and fall of the organic carbon values over this time period.

Area Specific Analysis

As weather patterns change through the time period, specific areas of Indiana were affected differently. The individual area requests being submitted are identified in Table 2, along with the specific counties and cities affected.

Table 2 – Section Reports

Section #	Section Name	City (s)	County (s)
1	Lake County	East Chicago Gary Griffith Hammond	Lake
2	Northwest	Michigan City LaPorte Dunes Lakeshore Ogden Dunes	LaPorte LaPorte Porter Porter
3	North	South Bend Elkhart	St. Joseph Elkhart
4	Northeast	Ft. Wayne	Allen
5	Central	Kokomo Lafayette	Howard Tippecanoe
6	East Central	Anderson Muncie Mechanicsburg	Madison Delaware Henry
7	Indianapolis	Indianapolis	Marion
8	West	Terre Haute	Vigo
9	Vincennes	Vincennes	Knox
10	Jasper	Jasper Dale	Dubois Spencer
11	Evansville	Evansville	Vanderburgh
12	Southeast	New Albany Jeffersonville	Clark

Review and Comment
Proposed Exceptional Events Requests are posted on the IDEM website for review and comment for thirty (30) days.

Comments can be emailed to

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or mailed to

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